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| 08/851,465 | 05/05/1997 | EDGAR C. ROBINSON | INT21246 | 5986 |

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| EXAMINER | |
|---|---|
| COCKS, JOSIAH C | |
| ART UNIT | PAPER NUMBER |
| 3749 | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 08/851,465 | ROBINSON ET AL. | |
| | Examiner | Art Unit | |
| | Josiah Cocks | 3749 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *23 August 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

### *Response to Amendment*

1. Receipt of applicant's amendment filed August 23, 2007 is acknowledged.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. **Claims 1, 2, and 4-8** are rejected under 35 U.S.C. 103(a) as being unpatentable over **U.S. Patent No. 3,428,406 to Nutten et al.** ("Nutten") in view of **U.S. Patent No. 3,245,458 to Patrick et al.** ("Patrick") and **U.S. Patent No. 4,061,463 to Bennett** ("Bennett").

Nutten discloses in Figures 1-32 a liquid fuel burner assembly in the same field of endeavor as applicant's invention and similar to that described in applicant's claims 1, 2, and 4-8. **(Bolded text below references elements and sections from the prior art.)**

In particular, in regard to at least claim 1, Nutten shows a burner assembly comprising a burner tube **(cylindrically shaped member 16 that includes hollow sleeve/tube 18, see col. 4, lines 10-13)**, an air aspirated nozzle **(40)**, a compressor to provide air under positive pressure to the air aspirated nozzle **(see at least col. 4, lines 66-69 describing that air is compressed in pump chamber 22)**, a fuel supply tank **(54)** to supply liquid fuel in liquid form and at ambient pressure to the air aspirated nozzle **(see col. 4, lines 42-49)**, the fuel entering the nozzle under negative pressure created by air entering the air aspirated nozzle under positive pressure **(see at least col. 4, lines 50-56).** Fuel and air being mixed within the air aspirated nozzle and being combusted substantially with the burner tube **(18)** immediately adjacent to and downstream from the air-aspirated nozzle **(40) (see at least col. 4, lines 50-56).**

In regard to the recitation of a metering valve, this limitation is considered met by at least the valve **(160)** of Nutten. The valve **(160)** is operated to control the flow of fuel to the burner nozzle **(40)**. This valve may completely shut off the fuel flow but is also described as being operated in a "partially open position" **(see col. 7, lines 36-40)** and may "reduce or shut off" the flow of fuel **(see col. 8, lines 56-61).** This disclosure of the valve being "partially open" and operating to "reduce" fuel flow is considered to suggest a valve positioned as recited that functions to meter the fuel as recited in applicant's claim.

In regard to at least claims 2 and 4, the burner assembly of Nutten further includes a zero pressure regulator **(see the diaphragms 94, 142, Fig. 5)** contained with the control unit **(60)** that

function to control fuel flow in the event of failure of the air flow, and pressure actuated arrangements for controlling flow of liquid fuel to the burner **(see at least col. 2, lines 22-40 and col. 9, lines 14-34 describing the operation of the pressure responsive diaphragms in unit 60).**

In regard to at least claim 5, note fuel supply is a fuel tank **(54).**

In regard to at least claim 6, the pump chamber/compressor **(22)** is operatively connected to the fuel tank **(54)** to create suction in the fuel tank **(see col. 4, lines 46-41).**

In regard to at least claim 7, at least valve **(110)** within control unit **(60)** has a first and second position such that in a first position vacuum from the compressor is applied to the fuel tank and in a second position the compressor is isolated from the fuel tank **(see at least col. 7, line 41 through col. 8, line 5).**

In regard to at least claim 8, manual valve **(58)** is provided to isolate the fuel tank and air aspirated nozzle such that in a first position fuel is allowed to pass to the nozzle and in a second position fuel is isolated from the nozzle **(see col. 4, lines 42-44 and col. 7, lines 49-52).**

Nutten does not disclose that the burner is an infrared burner that includes a burner tube that has a perforated outer surface.

However, Patrick is cited to remedy this deficiency. Patrick teaches a liquid fuel fired burner that is considered analogous art to both applicant's invention and Nutten. The liquid fuel burner of Patrick is expressly noted to be an infrared burner **(see col. 1, lines 8-9).** This infrared burner includes a burner tube that includes a burner tube that is perforated that is typical of

infrared burner assemblies **(see Fig. 7 showing a burner tube 510 that includes perforations 514 and 518e in outer surfaces 512 and 518).**

Bennett is cited to provide clear motivation as to why one of ordinary skill in the art would be prompted to modify the burner assembly of Nutten to be arranged in the form of an infrared burner having a perforated burner tube. Bennett shows a liquid fuel burner that is considered analogous art to each of applicant's invention, Nutten, and Patrick. In Bennett, it is expressly noted that infrared burners are characterized in that combustion occurs "against an incandescent surface" **(see Bennett, col. 3, lines 24-27)** and are a preferred category of burner because of their cleanliness and efficiency **(see Bennett, col. 3, lines 15-17).** Further, Bennett also clearly provides that liquid fuel burners (such as each of Nutten and Patrick) are understood to be more susceptible to flame quenching than gas fuel burners **(see Bennett, col. 3, lines 18-23)**. Flame quenching producing undesirable soot that is detrimental to industrial finishes and other heating processes **(Id.)**. Accordingly, liquid fuel burners are desirably formed as infrared burners to minimize the possibility of flame quenching since combustion in these types of burners occurs against an incandescent surface of the burner (such as the perforated burner tube of Patrick), which is generally at a temperature of 1600 to 2500 degrees Fahrenheit and is above the quenching temperatures **(see Bennett, col. 3, lines 23-27).**

Therefore, in regard to claim 1, 2, and 4-8, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the burner tube of Nutten to be formed as a perforated burner tube, thus allowing Nutten to operate as an infrared burner, as shown in Patrick as infrared fuel burners are recognized for their cleanliness and efficiency **(see Bennett, col. 3, lines 15-17)**, and in the case of liquid fuel burners, operation of a burner as an

infrared burner to minimize the possibility of flame quenching since combustion in these types of burners occurs against an incandescent surface of the burner, which is generally at a temperature of 1600 to 2500 degrees Fahrenheit and is above the quenching temperatures **(see Bennett, col. 3, lines 23-27)**.

5. **Claim 3** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Nutten** in view of **Patrick** and **Bennett** as applied to claim 2 above, and further in view of **U.S. Patent No. 3,361,183 to Reichhelm** ("Reichhelm").

Nutten in view of Patrick and Bennett suggest substantially all the limitations of claim 3 (note discussion above) with the possible exception that the fuel metering valve is specifically a manually adjustable valve. The examiner does note that the shut off valve **(58)** us described as being manually operable **(see col. 7, line 44),** however, the valve **(160),** which functions as the recited fuel metering valve, is not expressly disclosed as being "manually adjustable".

Reichhelm teaches a liquid fuel burner in the same field of endeavor as both applicant's invention and Nutten. In Reichhelm, the burner includes a liquid fuel control **(22)** valve that is interposed within the liquid fuel line **(see col. 4, lines 60-62)** to desirably allow metering of the fuel flow during operation of the burner to contribute to the production of desired flame settings **(see col. 6, lines 1-4)** and to achieve desired characteristics of burner performance **(see col. 5, lines 54-57).** As shown particularly in Fig. 2, valve **(22)** includes a handle that is rotated in order to allow the metering of the fuel. Accordingly, this valve is considered a metering valve that is manually adjustable as recited in applicant's claim 3.

Therefore, in regard to claim 3, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the fuel control valve (at least 160) of Nutten to incorporate manual adjustability as taught Reichhelm as such manual operation is clearly recognized in the art for the desirable purpose of controlling air and fuel ratio during operation of the burner to contribute to the production of desired flame settings **(see Reichelm, col. 6, lines 1-4)** and to achieve desired characteristics of burner performance **(see Reichelm, col. 5, lines 54-57).**

***Response to Arguments***

6. Applicant's arguments filed August 23, 2007 have been carefully considered but they are not persuasive.

Applicant initially argues that Nutten does not teach or suggest an infrared burner where liquid fuel is drawn into the combustion chamber through an air aspirated nozzle which air creates the suction to draw in the liquid fuel (see response, p. 4).

In response, the examiner admits that Nutten does not disclose an infrared burner. As has been made clear from the teachings of Bennett and Patrick (note discussion above), the characteristic that qualifies a burner as an "infrared burner" is combustion that occurs "against an incandescent surface" **(see Bennett, col. 3, lines 24-27).** In applicant's invention, this incandescent surface is formed by a perforated burner tube (at least 111 in applicant's disclosure). Similarly, in Patrick, the incandescent surface is also formed by a perforated burner tube **(see Patrick, Fig. 7 and burner tube 510 that includes perforations 514 and 518e in outer surfaces 512 and 518).** Nutten does not appear to disclose such a incandescent surface,

however, Nutten does clearly show a burner in which liquid fuel is drawn into the combustion chamber than an air aspirated nozzle which air creates the suction to drawn in the liquid fuel **(see Nutten, at least col. 3, line 2 through col. 4, line 4)**. Again, however, instead of an incandescent surface, the resulting flame is not constrained by a structure such as a perforated burner tube.

The following are copies of Figures from each of applicant's disclosure and Nutten illustrating the respective burner assemblies for comparison purposes (*next page*):

**Rotated Copy of Applicant's Fig. 5A** (the examiner has added the lead arrow and "perforated burner tube" text appearing below).

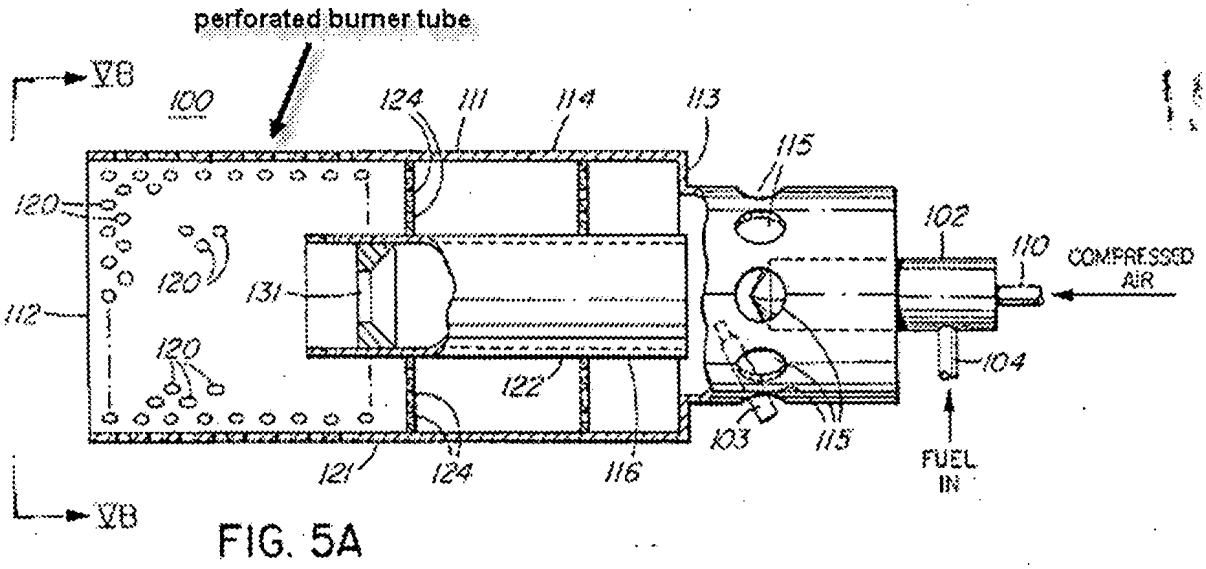


FIG. 5A

**Segment of Fig. 1 of Nutten** (the examiner has added the lead arrows and text appearing below).

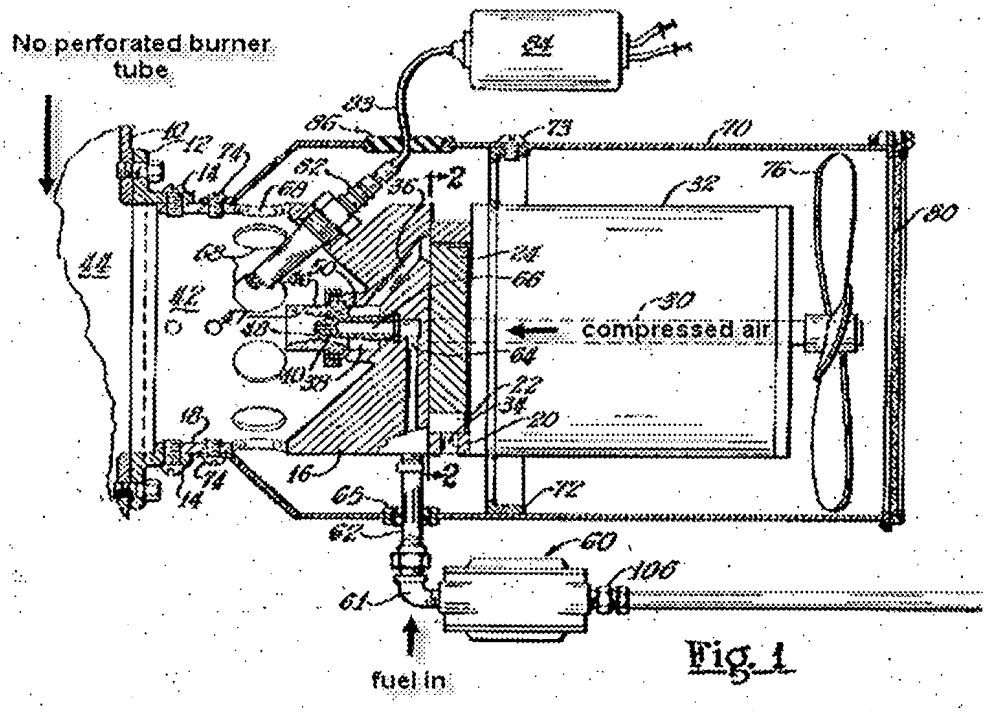


Fig. 1

As discussed and above and illustrated in the segments of applicant's Fig. 5A and Nutten's Fig. 1, Nutten discloses all the elements of applicant's claim 1 with the exception of a burner tube with a perforated outer surface rendering the burner an "infrared burner." However, the examiner has pointed to Patrick showing the use of a perforated burner tube in the burner art forming an "infrared burner." The following is a segment of Fig. 7 of Patrick which is disclosed as being an infrared liquid fuel burner (*next page*):

**Segment of Fig. 7 of Patrick** (the examiner has added the lead arrow and text appearing below).

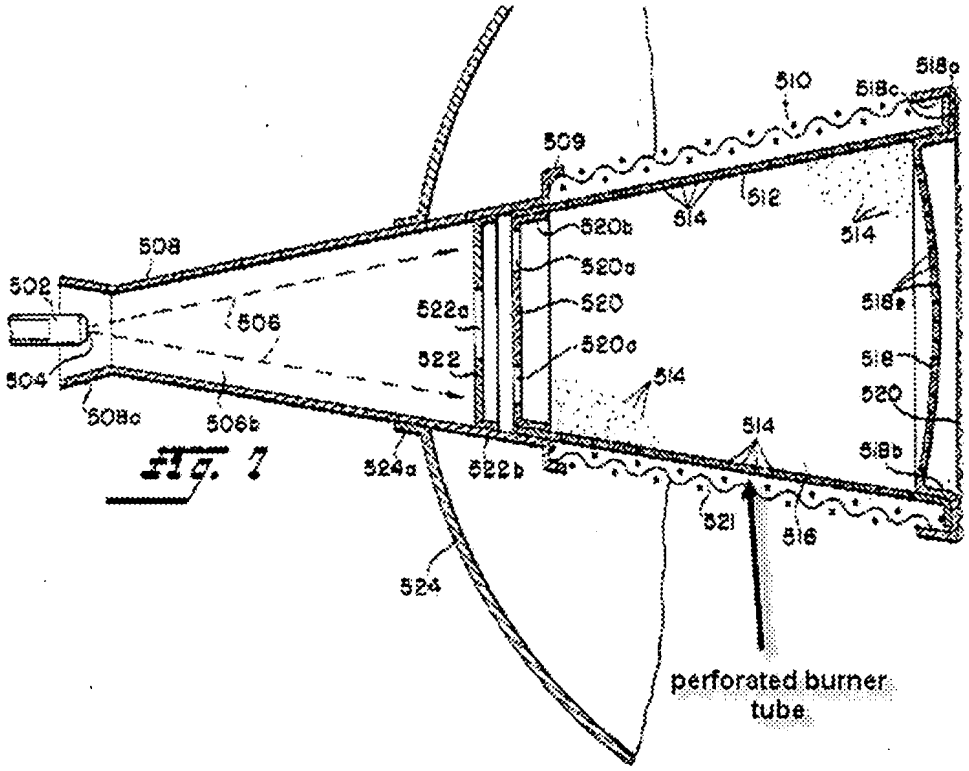


Fig. 7

As has been noted above, the deficiency of a perforated burner tube rendering the burner an "infrared burner" is remedied by Patrick, which clearly shows a perforated burner tube substantially identical to that claimed and disclosed by applicant. This perforated burner tube in Patrick forms an incandescent surface that renders the burner an infrared burner. Again, infrared burners have bee recognized in the liquid fuel burner area as being desirable because of their cleanliness and efficiency **(see Bennett, col. 3, lines 15-17)** and for minimizing the possibility of flame quenching since combustion in these types of burners occurs against an incandescent surface of the burner (such as the perforated burner tube of Patrick), which is generally at a temperature of 1600 to 2500 degrees Fahrenheit and is above the quenching temperatures **(see Bennett, col. 3, lines 23-27).**

Applicant also argues that Bennett can not be applied as a teaching reference because Bennett suggests that use of a premix type infrared burner, whereas applicant intends a burner in which fuel and air are mixed a the nozzle. The examiner respectfully disagrees.

In response, the examiner notes that this argument has been thoroughly addressed in prior Office actions including the most recent Office action mailed February 22, 20007. However, the examiner again makes the following observations:

While Bennett does indicate that infrared burners are generally regarded as being of the pre-mix type **(Bennett, col. 1, lines 22-24),** this is not regarded as an assertion that infrared burners cannot also function where the fuel and air are mixed at the burner rather then before. To support this conclusion, the examiner notes that Bennett makes clear that the benefit provided by an infrared type burner is in the combustion that occurs "against an incandescent surface" enabling temperatures well above quenching temperatures **(see Bennet, col. 3, lines 24-27).** A person of ordinary skill in the art would reasonably recognize that combustion against the incandescent surface would be capable (and desirable) regardless of whether the combustion feeds (i.e. fuel and air) are pre-mixed or mixed at the burner. Support for this assertion is found in the reference to Patrick. As noted above, Patrick clearly shows an infrared burner that includes a burner tube with a perforated outer surface. This burner operates by mixing in the vicinity of a burner a flow of fuel from a fuel nozzle **(504)** with a flow of compressed air provided by blower **(612).** The combustible mixture is ignited and combusts against an incandescent surface that is in the form of a perforated outer tube in the same manner as disclosed by applicant. Again, as is made clear in Bennett, this combustion against an incandescent surface is desirably in liquid fuel burners. Accordingly, a person of ordinary skill

in the art would reasonably seek to modify the liquid fuel burner of Nutten to include an incandescent combustion surface in the form of a perforated burner tube as taught in Patrick to obtain the recognized benefits described in Bennett.

Applicant also argues that because Patrick teaches the use of fuel under pressure which draws air into the nozzle instead of the situation in applicant's invention where air under pressure draws fuel into the nozzle it cannot be used to obviate applicant's claims. The examiner respectfully disagrees.

In response, the examiner initially notes that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Further, in determining whether claims are patentable in view of combination and modification of prior patents, the proper inquiry should not be limited to the specific structure shown by a reference, but should be into the concepts fairly contained therein, with the overriding question to be determined being whether those concepts would have suggested to one skilled in the art the modification called for by the claims. See *In re Bascom*, 230 F.2d 612, 614, 109 USPQ 98, 100 (CCPA 1956). Additionally, under 35 U.S.C. § 103, a reference must be considered not only for what it expressly teaches, but also for what it fairly suggests (*In re Burckel*, 592 F.2d 1175, 1179, 201 USPQ 67, 70 (CCPA 1979); *In re Lamberti*, 545 F.2d 745, 750, 192 USPQ 278, 280 (CCPA 1976)), as well as the reasonable inferences which the artisan would logically draw from the reference. See *In re Shepard*, 319 F.2d 194, 197, 138 USPQ 148, 150 (CCPA 1963).

In the present case, the examiner notes that the primary reference to Nutten clearly and unambiguously shows a burner in which air under pressure serves to draw in fuel into the nozzle in the same manner as applicant's claims and disclosure. Further, the examiner notes that Patrick makes clear that while fuel may be supplied under pressure to draw in air it is well understood that in lieu of such an arrangement, a compressed air source **(blower 614, Fig. 8)** may be provided to cause mixing of air and fuel from nozzle **(504) (see Patrick, col. 15, lines 21-27)**. Regardless, the result is a spray of fuel and air that enters into a combustion area for ignition and subsequent combustion. This the identical result of each of applicant's invention and Nutten. A person of ordinary skill in the art would reasonably and fairly understand that a liquid fuel and air spray may be produced in a burner assembly either through a fuel under pressure that draws in air or by air under pressure that draws in fuel. Further still, as made clear in Bennett, when a burner uses liquid fuel, such a burner is desirably an infrared burner where combustion takes place against an incandescent surface **(such as the perforated burner tube of Patrick)** because of its cleanliness and efficiency **(see Bennett, col. 3, lines 15-17)** and for minimization the possibility of flame quenching since combustion against an incandescent surface of the burner is generally at a temperature of 1600 to 2500 degrees Fahrenheit and is above the quenching temperatures **(see Bennett, col. 3, lines 23-27).**

Applicant does not appear to separately argue against the teachings of Reichhelm. As noted above, Reichhelm is cited for the showing that a metering valve **(such as that shown at 160 in Nutten)** would be understood in the art to be manually adjustable. Accordingly, Reichhelm is considered to properly show that for which it has been cited.

Accordingly, applicant's arguments have been carefully considered but are not persuasive. Applicant's claims do not patentably distinguish applicant's invention over the prior art of record.

***Conclusion***

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Josiah Cocks whose telephone number is (571) 272-4874. The examiner can normally be reached on M-F 8:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven McAllister, can be reached (571) 272-6785. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

jcc
November 5, 2007

JOSIAH COCKS
PRIMARY EXAMINER
ART UNIT 3749